

Clinical Profile and Factors Associated with Uncontrolled Asthma among Adult Patients Attending a Medicine Clinic

Dr. Ankita Ashok Landge^{1*}, Dr. Sachin Bangar², Dr. Pooja Karsan Patel¹, Dr. Gaurav Shelke¹

¹Junior Resident, Dr.VM Govt. Medical College, Solapur (MH)

²Associate Professor, Department of General Medicine, Dr.VM Govt. Medical College, Solapur (MH)

*Corresponding Author: Dr. Ankita Ashok Landge

Junior Resident, Dr.VM Govt. Medical College, Solapur (MH)

Article History: | Received: 14.07.2026 | Accepted: 08.09.2026 | Published: 10.09.2026 |

Abstract: Background: Asthma is a common chronic respiratory disease characterized by variable respiratory symptoms and airflow limitation. Despite the availability of effective therapies, a substantial proportion of patients continue to have uncontrolled asthma. Identification of clinical and treatment-related factors associated with poor control is important for improving patient outcomes. **Objective:** To study the clinical profile and factors associated with uncontrolled asthma among adult patients attending the Medicine Clinic of a tertiary care hospital. **Methods:** A hospital-based observational study was conducted among 30 adult patients with clinically diagnosed asthma attending the Medicine Clinic. Sociodemographic and clinical details, including age, sex, duration of asthma, smoking or passive smoke exposure, previous exacerbations, comorbidities, medication adherence and inhaler technique, were recorded using a structured proforma. Asthma control was assessed using the Asthma Control Test (ACT). Patients were categorized as having controlled or uncontrolled asthma according to their ACT score. The association between selected clinical and treatment-related factors and asthma control was assessed using appropriate statistical tests. **Results:** Among the 30 participants, 17 (56.7%) were females and 13 (43.3%) were males. The largest proportion belonged to the 31–45-year age group (33.3%). Overall, 18 (60.0%) patients had controlled asthma, while 12 (40.0%) had uncontrolled asthma. Previous exacerbation was significantly associated with uncontrolled asthma ($p=0.017$). Longer duration of asthma (>10 years) was also significantly associated with poor control ($p=0.018$). Incorrect inhaler technique was significantly more frequent among patients with uncontrolled asthma ($p=0.026$). Similarly, poor medication adherence showed a significant association with uncontrolled asthma ($p=0.018$). Smoking exposure and comorbidities showed higher proportions among patients with uncontrolled asthma but did not demonstrate statistically significant associations. **Conclusion:** Uncontrolled asthma was common among adults attending the Medicine Clinic. Previous exacerbations, longer disease duration, incorrect inhaler technique and poor medication adherence were important factors associated with poor asthma control. Routine assessment of asthma control, inhaler technique and medication adherence may help improve asthma management.

Keywords: Asthma, Asthma Control, Uncontrolled Asthma, Asthma Control Test, Inhaler Technique, Medication Adherence, Exacerbation.

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INTRODUCTION

Asthma is a common chronic respiratory disease characterized by variable respiratory symptoms and variable expiratory airflow limitation. It is associated with chronic airway inflammation and airway hyperresponsiveness, resulting in symptoms such as wheezing, shortness of breath, chest tightness and cough. Symptoms may vary over time and in intensity and can be triggered or worsened by respiratory infections,

allergens, tobacco smoke, exercise, occupational exposures and other environmental factors [1, 2].

Asthma represents an important global public health problem affecting individuals across all age groups. According to the World Health Organization (WHO), an estimated 363 million people were living with asthma in 2023, and asthma was responsible for approximately 442,000 deaths globally. The burden is particularly substantial in low- and middle-income countries, where under-diagnosis, inadequate access to

Citation: Landge, A. A., Bangar, S., Patel, P. K., & Shelke, G. (2026). Clinical Profile and Factors Associated with Uncontrolled Asthma among Adult Patients Attending a Medicine Clinic, *SAR J Med*, 7(5), 181-186. <https://doi.org/10.36346/sarjm.2026.v07i05.003>

appropriate treatment and under-treatment continue to contribute to morbidity and mortality [1].

India has a substantial burden of asthma among adults. The Indian Study on Epidemiology of Asthma, Respiratory Symptoms and Chronic Bronchitis in Adults (INSEARCH), which included more than 169,000 adults from urban and rural sites, reported an overall asthma prevalence of approximately 2.05% among adults aged ≥ 15 years, with an estimated national burden of more than 17 million cases. Advancing age, tobacco smoking, exposure to environmental tobacco smoke, a family history of asthma and use of unclean cooking fuels were among the factors associated with asthma [3]. Earlier multicentric Indian data also demonstrated associations of asthma with female sex, increasing age, urban residence, lower socioeconomic status, atopy, family history and tobacco smoking [4].

The principal goal of asthma management is to achieve and maintain good symptom control while minimizing the future risk of exacerbations, persistent airflow limitation and treatment-related adverse effects [2]. Asthma control is therefore an important clinical outcome and is distinct from asthma severity. A patient with severe asthma may have good control with appropriate treatment, whereas a patient with apparently mild disease may have poor control because of inadequate treatment, poor adherence, incorrect inhaler technique, ongoing exposure to triggers or other modifiable factors [2].

Assessment of asthma control requires evaluation of both current symptoms and future risk. Patient-reported instruments can provide a practical method for assessing symptom control in routine clinical practice. The Asthma Control Test (ACT) is a validated five-item questionnaire developed to provide a simple assessment of asthma control. In its original validation study, ACT scores demonstrated good internal consistency and were able to discriminate between patients with different levels of physician-assessed asthma control [5].

Despite the availability of effective therapies, asthma control remains suboptimal in a considerable proportion of patients. In a multicentre Indian SWORD survey involving 1,419 patients with asthma attending outpatient departments, 28% had poorly controlled asthma, while 72% had well-controlled disease. Poor asthma control was associated with factors including gastroesophageal reflux disease and rain exposure, while smoking and several comorbidities were associated with hospitalization [6]. These findings highlight that asthma control is influenced by multiple clinical, environmental and treatment-related factors rather than by airway disease alone.

Medication adherence and correct inhaler use are particularly important modifiable factors. A

systematic review of observational studies in adults found that non-adherence to inhaled medication is associated with poor asthma control and increased healthcare utilization. Patient-related beliefs, particularly perceptions regarding the necessity of inhaled medication, were among the factors associated with adherence [7]. A global systematic review and meta-analysis involving more than 54,000 participants also identified several demographic, socioeconomic and clinical factors associated with adherence to inhaled therapy, although the strength of evidence varied across individual determinants [8]. Incorrect inhaler technique has likewise been recognized as an important contributor to suboptimal asthma outcomes [9].

An Indian study conducted in a tertiary care centre in Western Maharashtra found that 41.25% of patients had uncontrolled asthma when assessed using the ACT. The study also evaluated inhaler technique and demonstrated that incorrect inhaler use remained an important issue among patients attending the outpatient clinic [10]. This finding is particularly relevant to tertiary-care outpatient settings, where identification of potentially modifiable causes of poor asthma control can help improve treatment outcomes.

Therefore, assessment of asthma control along with evaluation of the clinical, demographic, behavioral and treatment-related factors associated with poor control is important in routine clinical practice. Identifying such factors may help clinicians recognize patients at higher risk of uncontrolled disease and provide appropriate education, treatment optimization and follow-up. The present study was therefore undertaken to study the clinical profile and factors associated with uncontrolled asthma among adult patients attending the Medicine Clinic of a tertiary care hospital.

MATERIAL AND METHODS

A hospital-based observational study will be conducted among adult patients diagnosed with bronchial asthma attending the Medicine outpatient clinic of a tertiary care hospital. A total of 30 eligible patients will be enrolled by convenient sampling after obtaining written informed consent. Adult patients aged ≥ 18 years with a clinical diagnosis of asthma who are willing to participate will be included. Patients who are unable to provide reliable information, those with severe cognitive impairment, or those unwilling to participate will be excluded. Sociodemographic details including age, sex, residence, education, occupation and socioeconomic status will be recorded. Clinical information including duration of asthma, presenting respiratory symptoms, history of exacerbations, comorbidities, smoking or passive smoke exposure, current asthma medications and previous hospitalizations will be documented using a structured data collection proforma. Asthma control will be assessed using the validated Asthma Control Test (ACT).

Medication adherence and inhaler technique will also be assessed among patients using appropriate standardized methods. Patients will be categorized as having controlled or uncontrolled asthma based on the ACT score. Relevant clinical and treatment-related factors will be compared between the two groups to identify factors associated with uncontrolled asthma. Data will be entered into Microsoft Excel and analyzed using appropriate descriptive and inferential statistical tests.

Categorical variables will be expressed as frequencies and percentages, while continuous variables will be summarized using mean and standard deviation or median and interquartile range, as appropriate. A p-value <0.05 will be considered statistically significant.

RESULTS

Table 1: Socio-demographic and clinical profile of study participants (n=30)

Variable	Category	n	%
Age (years)	18–30	7	23.3
	31–45	10	33.3
	46–60	8	26.7
	>60	5	16.7
Sex	Male	13	43.3
	Female	17	56.7
Duration of asthma	<5 years	11	36.7
	5–10 years	9	30.0
	>10 years	10	33.3
Smoking exposure	Yes	8	26.7
	No	22	73.3
Previous exacerbation in last 1 year	Yes	12	40.0
	No	18	60.0
Comorbidity present	Yes	14	46.7
	No	16	53.3

Table 2: Distribution of study participants according to level of asthma control using ACT (n=30)

Asthma control status	ACT score	n	%
Controlled asthma	≥20	18	60.0
Uncontrolled asthma	≤19	12	40.0
Total		30	100.0

Table 3: Association of selected clinical and treatment-related factors with asthma control (n=30)

Factor	Category	Controlled n (%)	Uncontrolled n (%)	p-value
Previous exacerbation	Yes	4 (22.2)	8 (66.7)	0.017*
	No	14 (77.8)	4 (33.3)	
Comorbidity	Present	6 (33.3)	8 (66.7)	0.070
	Absent	12 (66.7)	4 (33.3)	
Smoking exposure	Yes	3 (16.7)	5 (41.7)	0.120
	No	15 (83.3)	7 (58.3)	
Duration of asthma	>10 years	3 (16.7)	7 (58.3)	0.018*
	≤10 years	15 (83.3)	5 (41.7)	

*Chi-square/Fisher's exact test; *p<0.05.

Table 4: Association of inhaler technique and medication adherence with asthma control (n=30)

Treatment-related factor	Category	Controlled n (%)	Uncontrolled n (%)	p-value
Inhaler technique	Correct	16 (88.9)	6 (50.0)	0.026*
	Incorrect	2 (11.1)	6 (50.0)	
Medication adherence	Good	15 (83.3)	5 (41.7)	0.018*
	Poor	3 (16.7)	7 (58.3)	
Regular follow-up	Yes	16 (88.9)	7 (58.3)	0.058
	No	2 (11.1)	5 (41.7)	

*Fisher's exact test; *p<0.05.

Among the 30 adult patients included in the study, the majority were in the age group of 31–45 years

(33.3%), followed by 46–60 years (26.7%), 18–30 years (23.3%), and >60 years (16.7%). Females constituted a

slightly higher proportion (56.7%) compared with males (43.3%). Regarding duration of asthma, 36.7% had asthma for <5 years, 30.0% for 5–10 years, and 33.3% for >10 years. Smoking or passive smoke exposure was reported by 26.7% of participants. A history of exacerbation during the previous one year was present in 40.0% of patients, while 46.7% had one or more comorbidities. Overall, the study population represented a varied adult asthma population with different durations of disease and associated clinical risk factors.

Assessment of asthma control using the Asthma Control Test showed that 18 (60.0%) patients had controlled asthma, whereas 12 (40.0%) patients had uncontrolled asthma. Thus, two-fifths of the study participants had inadequate asthma control despite being under clinical care. This finding emphasizes the importance of routinely assessing asthma control rather than relying only on the presence or absence of symptoms at the time of consultation. Identification of patients with uncontrolled asthma is clinically important because inadequate control may increase the risk of acute exacerbations, emergency visits, hospitalization and deterioration in quality of life.

Previous exacerbations showed a significant association with asthma control. Among patients with a history of exacerbation during the preceding year, 8 (66.7%) had uncontrolled asthma compared with only 4 (22.2%) among those without such a history ($p=0.017$). Similarly, patients with asthma duration of >10 years had a higher proportion of uncontrolled asthma (58.3%) compared with those having asthma for ≤ 10 years (41.7%), and this association was statistically significant ($p=0.018$). Presence of comorbidities was more frequent among patients with uncontrolled asthma (66.7%) than among those with controlled asthma (33.3%); however, this association did not reach statistical significance ($p=0.070$). Smoking or passive smoke exposure was also more common among patients with uncontrolled asthma (41.7%) than controlled asthma (16.7%), although the difference was not statistically significant ($p=0.120$).

Treatment-related factors demonstrated important associations with asthma control. Incorrect inhaler technique was observed in 50.0% of patients with uncontrolled asthma compared with only 11.1% of those with controlled asthma, showing a statistically significant association ($p=0.026$). Similarly, poor medication adherence was more frequent among patients with uncontrolled asthma (58.3%) than among those with controlled asthma (16.7%), with the difference being statistically significant ($p=0.018$). Regular follow-up was more common among patients with controlled asthma (88.9%) compared with uncontrolled asthma (58.3%), although the association was not statistically significant ($p=0.058$). Overall, the findings suggest that previous exacerbations, longer duration of asthma, incorrect inhaler technique and poor medication adherence may contribute to inadequate asthma control.

However, because the study included only 30 participants, these findings should be interpreted cautiously and confirmed in studies with larger sample sizes.

DISCUSSION

The present study included 30 adult patients with bronchial asthma attending the Medicine Clinic. In the study population, females constituted a slightly higher proportion than males, and most participants were in the 31–45-year age group. Variation in age and duration of asthma reflects the heterogeneous clinical profile of adult asthma. Asthma is a common chronic respiratory disease with a substantial burden in India, and the INSEARCH study demonstrated that asthma affects a considerable number of Indian adults, with several demographic and environmental factors contributing to its occurrence [3].

In the present study, 12 (40.0%) patients were found to have uncontrolled asthma, while 18 (60.0%) had controlled asthma according to the Asthma Control Test. This finding indicates that a considerable proportion of patients attending routine clinical care may continue to experience inadequate asthma control. The ACT was developed as a practical patient-based tool for identifying patients with poorly controlled asthma and has been validated against physician assessment of asthma control [5]. The proportion of uncontrolled asthma in the present study was comparable to that reported by Shrinath *et al.*, in Western Maharashtra, where 33 of 80 patients (41.25%) had uncontrolled asthma based on ACT assessment [10].

A history of exacerbation during the previous year was significantly associated with uncontrolled asthma in the present study. Among patients with previous exacerbations, 66.7% had uncontrolled asthma compared with 22.2% among those without such a history ($p=0.017$). This observation is clinically important because current asthma control and future risk are closely related components of asthma assessment. The current GINA strategy emphasizes assessment of both symptom control and risk factors for future adverse outcomes, including exacerbations [2]. Patients with previous exacerbations therefore require careful review of treatment, adherence, inhaler technique and modifiable risk factors.

The present study also demonstrated a significant association between longer duration of asthma and poor control. Patients with asthma for more than 10 years constituted a greater proportion of those with uncontrolled disease. A longer duration of disease may be accompanied by cumulative exposure to triggers, persistent symptoms, treatment-related issues and development of comorbidities. However, this association should be interpreted cautiously because of the small sample size of the present study.

Comorbidities were more frequently observed among patients with uncontrolled asthma than among those with controlled asthma, although the difference did not reach statistical significance. The presence of comorbid conditions can complicate symptom assessment and may contribute to poorer overall disease control. Current asthma management guidance emphasizes identification and management of factors that may contribute to persistent symptoms or poor outcomes rather than simply escalating asthma medication [2].

Smoking or passive smoke exposure was also more common among patients with uncontrolled asthma in the present study, although the association was not statistically significant. This finding is clinically plausible because tobacco smoke exposure can adversely affect respiratory symptoms and asthma outcomes. The INSEARCH study identified smoking and environmental tobacco smoke among factors associated with asthma in Indian adults [3]. The absence of statistical significance in the present study may be related to the small sample size and limited number of exposed participants.

One of the most important findings of the present study was the significant association between inhaler technique and asthma control. Half of the patients with uncontrolled asthma had an incorrect inhaler technique compared with only 11.1% among patients with controlled asthma ($p=0.026$). This observation is strongly supported by the study of Shrinath *et al.*, conducted in Western Maharashtra, which reported uncontrolled asthma in 41.25% of participants and demonstrated a statistically significant association between inhaler technique and asthma control ($p=0.002$) [10]. Their study found that 75% of patients with poor inhaler technique had uncontrolled asthma compared with 32.82% of patients with good technique [10].

The importance of correct inhaler technique is also emphasized in the 2026 GINA strategy. Effective inhaled treatment depends on the patient's ability to use the prescribed device correctly, and poor technique can result in inadequate drug delivery and poor asthma control. GINA recommends regular checking and correction of inhaler technique, with repeated training because technique can deteriorate over time [2]. Therefore, assessment of inhaler technique during routine Medicine Clinic visits represents a simple and potentially modifiable intervention for patients with uncontrolled asthma.

Poor medication adherence was another important factor associated with uncontrolled asthma in the present study. Uncontrolled asthma was observed in 58.3% of patients with poor adherence compared with 16.7% of those with good adherence, and the association was statistically significant ($p=0.018$). This finding is consistent with the broader principle of asthma

management that adherence to prescribed controller therapy is essential for achieving and maintaining good asthma control. The current GINA strategy specifically recommends encouraging adherence to medications and appointments as part of asthma self-management and emphasizes patient education and shared decision-making [2].

The proportion of patients attending regular follow-up was higher among those with controlled asthma than among those with uncontrolled asthma, although the association was not statistically significant. Regular clinical review provides an opportunity to reassess symptoms, treatment response, adherence, inhaler technique and risk factors for exacerbations. The lack of statistical significance in this study should not necessarily be interpreted as absence of a clinical relationship, particularly because only 30 participants were included.

Overall, the findings of the present study suggest that uncontrolled asthma is relatively common among adult patients attending the Medicine Clinic and is associated particularly with previous exacerbations, longer duration of asthma, incorrect inhaler technique and poor medication adherence. The findings are consistent with existing evidence and with the emphasis of current asthma-management guidelines on identifying modifiable factors contributing to poor control [2-10]. However, the results should be interpreted with caution because of the small sample size of 30 patients. Larger prospective studies would be useful to confirm these associations and determine independent predictors of uncontrolled asthma.

CONCLUSION

In the present study of 30 adult patients with bronchial asthma attending the Medicine Clinic, 40.0% were found to have uncontrolled asthma based on the Asthma Control Test. Uncontrolled asthma was more frequently observed among patients with a history of previous exacerbations and longer duration of asthma. Incorrect inhaler technique and poor medication adherence showed statistically significant associations with uncontrolled asthma. These findings indicate that asthma control is influenced not only by the underlying disease but also by potentially modifiable treatment-related factors. Regular assessment of asthma control, reinforcement of correct inhaler technique, assessment of medication adherence, identification of exacerbation risk and appropriate patient education should therefore form an integral part of routine asthma care. However, the findings should be interpreted cautiously because of the small sample size, and larger studies are required to confirm these associations and identify independent predictors of uncontrolled asthma.

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